Alamo River Wetlands at Holtville, CA
Long-Term Management Plan

Prepared by the Salton Sea Authority

In Partnership with the Citizen's Congressional
Task Force for the New River

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As part of the development of wetlands in the Alamo River, an operation and maintenance plan has been prepared to identify the activities needed to be undertaken to keep the system functioning in a healthy condition for multi-decade time frames. The specific objectives of this long-term management (LTM) plan are:

1) To optimize the water quality treatment efficiency of the Alamo River wetlands

2) To minimize any negative environmental impacts within or downstream of the wetlands

3) To enhance the aesthetic and environmental quality of the wetlands

The LTM plan specifies the various management techniques required to optimize the performance of the wetlands and maintain the overall health of the wetland systems. The LTM plan also provides a schedule for routine and major maintenance activities. The maintenance plan may need to be modified over time based on operational experience, monitoring results, and program evaluations.

Lessons Learned from New River Pilot Wetlands

A number of lessons learned at the New River pilot wetland sites have been applied to the designs of the Shank Road and Holtville wetlands on the Alamo River. The lessons learned have been applied to minimize the maintenance required on these projects and maximize their performance. Some key lessons learned that have been incorporated to minimize maintenance are:

- **More Effective Sediment Basins**. The sediment basins are designed to be larger and more easily accessible for cleanout. The New River pilot wetlands have been in operation for 10 years and have not yet required sediment cleanout. It is expected that the proposed Alamo River wetlands may not require cleanout for as much as 15-25 years.

- **On-Site Sediment Storage**. On-site sediment storage areas have been included in the wetland plans to eliminate the need to haul sediment from the site after sediment basin cleanout.

- **Improved Berm Designs**. Berms in the Alamo River wetlands have been designed with impermeable barriers and other measures to minimize bank erosion. Numerous muskrats have been observed in the pilot wetland systems and have caused damage to the berms. Design features at the Shank Road and Holtville wetlands will avoid these problems.

- **Gravity Flow Systems**. Both proposed Alamo River wetlands will be fed by simple gravity flow, avoiding the need for any pumping and associated maintenance.

- **Flood-Accommodating Designs**. Both proposed Alamo River wetland sites are located in floodplains well below (30-40 feet) the surrounding grade. They are designed to accommodate infrequent flooding without damage. Because the rainfall in the Imperial Valley is only about 2 inches per year and river flows are sustained by agricultural runoff, flood events are extremely rare.

Low Maintenance Wetlands

Because the designs incorporate the lessons learned discussed above, both the Shank Road and Holtville wetlands are designed to operate with very little maintenance required. The largest maintenance item will be sediment basin cleanout which is not expected to be required for many years.

Ownership and Responsibility for LTM

The owners of the sites, Desert Wildlife Unlimited and the City of Holtville will be responsible for their maintenance. The Holtville wetland will be maintained as part of normal City maintenance activities. Desert Wildlife Unlimited will likely work with the Imperial Irrigation District to support maintenance as funding is available.

Operation and Maintenance Activities

General operation and maintenance activities will take into account sensitive habitats and species of special concern. This may include avoiding certain maintenance activities in sensitive areas or during specific times of the year. The breeding and nesting period for birds may be a time when special precautions need to be taken. A biologist or wildlife specialist should be consulted to help identify species of concern or sensitive habitats.

The operation and maintenance plan is divided into three categories: routine, major, and emergency activities. A maintenance log should be kept to note all maintenance activities conducted in the wetlands.

Routine Operation and Maintenance Activities

Site Inspection

The Alamo River wetlands should be inspected on a routine basis to ensure that the wetlands are operating properly and to help identify any special needs or areas of concern. These inspections should include visually inspecting the physical appearance of the wetlands such as the condition of the berms and embankments, condition of diversion structures, health of the vegetation, and other related parameters. They should also include checking the operational aspects of the wetlands including the water levels, water quality, pumps and valves, and the flow control structures (weirs, inlet, and outlet structures).

During routine inspections, the need for trash or debris for removal should be identified. Small trash that does not require the use of machinery for removal should be removed during the

routine inspections. The inspector should also note any signs of vandalism so repairs can be ordered in a timely manner when necessary. At the beginning of the LTM activities, these inspections should be conducted on a weekly basis. The frequency of site inspections may vary depending on the site, monitoring requirements, and the season of the year. Once it is established that wetlands are functioning properly, the frequency of these visits can be scaled down.

Inlet, Outlet, and Weir Inspection

The proper maintenance of the inlet, outlet, and weir structures is necessary to ensure that water can freely flow through the wetland systems. During the site inspections, these structures should be visually inspected to identify any type of damage or impediment of flow through these structures. Equipment being used in the wetlands or vandals may cause damage to these structures. Trash, floating vegetation, or woody debris can also build up in these structures and impede the flow of water. Floating vegetation may be an issue in the fall after the end of the growing season. However, these structures may become clogged with debris at other times of the year as well, so it is important to routinely check them. It may be necessary to remove debris and trash from the flow structures occasionally depending upon how much litter/debris is being produced by the wetland system. The debris removed from the system should be hauled away and not left on the access roads.

Water Level Management

Water level management is a critical factor in determining the health of a wetland vegetation community and the successful operation of a constructed wetland treatment system. Maintaining water levels within the tolerance limits of the desired wetland plant species will help to establish and maintain the desired plant community (Davis, 1994). Certain species of emergent wetland plants may require periodic drawdown of the water levels to encourage the growth of new shoots. Water levels can also be manipulated to control prolific growth and the spread of undesirable weedy plants (Hammer, 1989). During the routine inspections, the water levels should be checked and adjusted accordingly. Any major drop in the water level should be reported immediately, so that the cause can be identified and the necessary repairs or corrections can be made as soon as possible. A wetland specialist may need to be consulted to determine the optimal water levels or drawdown periods to maintain a healthy plant community within the wetlands.

Water Quality Sampling

Water quality sampling needs to be conducted to evaluate the treatment effectiveness of individual wetlands. Data from the pilot wetlands has shown that inflow and outflow concentrations of most parameters of interest are variable over time, and multiple measurements need to be taken over the course of a year to obtain a reasonable representation of wetland functioning. Although intensive laboratory analysis of water quality parameters, as performed during the pilot wetland testing, may be too expensive for routine operation and maintenance and evaluation, it is proposed that a combination of regular field testing combined with less frequent laboratory testing be conducted to characterize the performance of individual

wetlands. Field measurements or tests may be taken during routine site inspections to help identify any potential problems. A simple water quality meter or field test kit that measures standard field water quality parameters is a quick and easy way to check the general water quality conditions in the wetland. A water quality measurement can be taken at the inlet, a point in the middle, and at the outlet of the wetland to get a quick feel for the overall water quality in the wetland. A more detailed water quality analysis, with the collection of additional chemical parameters, will be conducted based on the requirements of the monitoring plan. A more detailed evaluation of the water quality is typically conducted on a quarterly basis.

Trash and Debris Removal

Trash and debris within and near the wetlands should be removed on an as needed basis. It is necessary to remove this waste, because it can get into the wetland itself and impede the flow of water through flow structures. It can also lead to access problems within the wetland by blocking or piling up on the access roads. During the site inspections, small trash and debris can be removed at any time. However, larger debris and trash may need to be removed through the use of large machinery.

Minor Vegetation Maintenance

The removal of excess vegetation growing along the berms and embankments in constructed wetlands may be needed for maintaining good access to different parts of the wetlands. Having easy access to weirs and drains along the access roads simplifies the routine maintenance activities to be conducted in the wetlands (water level and flow control). Due to the steep nature of the berms and embankments surrounding the Alamo River wetlands, traditional rotary mowers and riding mowers cannot be used for the removal of vegetation from the berms and embankments. A tractor with a boom flail attachment or using a handheld gas-powered trimmer may be the best methods for removing brush and vegetation along the berms and embankments. A tractor with a boom flail attachment is specially designed for removing vegetation in hard to reach places like pond embankments or ditches. Berms and embankments will be maintained on an as needed basis to help maintain access to the wetlands.

Minor Sediment Removal

Sediment deposits may build up around the inlet structures or in the deep pools in front of these structures. These deposits can obstruct water flow, reduce sedimentation performance, and may contain elevated levels of contaminants. It is necessary to remove these sediment deposits to maintain the overall performance of the constructed wetland systems. These sediment prone areas should be checked 3 to 4 times per year and the sediment deposits should be removed when excess accumulation is noted. The sediment that is removed should be tested for contaminants to determine if special handling of the material is required.

Nuisance Wildlife

Muskrats can be destructive in constructed wetlands. Numerous muskrats have been observed in the pilot wetland systems. Muskrats can cause major damage to berms, embankments, and

access roads by burrowing or digging into them and leading to increased bank erosion or leakage from certain areas within the wetlands. It may be necessary to trap and remove muskrats or beavers from the wetlands to prevent further damage. Berms in the Alamo River wetlands have been designed with impermeable barriers to prohibit muskrats from creating burrows which pierce the barriers and cause piping problems.

Insect Abatement

One of the major human health concerns from constructed wetlands is the excessive production of mosquitoes or other nuisance insects from the wetlands. The best approach to avoiding mosquito problems in constructed wetlands is to create conditions that are not suitable to larval development. These conditions include eliminating stagnant backwaters, shading the water surface, creating a good balance between open water areas and vegetation, and dispersing floating mats of duckweed or other floating plants.

The production of mosquitoes can also be controlled through the use or introduction of mosquitofish, with biological sprays, or with chemical sprays. A healthy population of mosquitofish was observed in the New River pilot wetlands, so it may be important to maintain conditions in the wetlands that are suitable for mosquitofish to help control the mosquito population. As a last resort, it may be required to use an insecticide to control the mosquito population. If the use of an insecticide is required, then one that is suited for use in environmentally sensitive areas should be selected (temephos is an example of a suitable pesticide). Any application of chemical or biological agents should be performed by a certified professional in accordance with manufacturer guidelines and following applicable California laws and regulations. During the site inspection, the abundance of mosquitoes or other biting insects should be noted. A simple hand net can be used to help determine the abundance of mosquitoes in the wetland. One larva per 2 or 3 scoops may be an indication that additional management activities may be necessary to control the mosquito population.

As was noted above, a healthy population of mosquitofish was observed in the New River constructed wetlands. However, it may be necessary to stock additional mosquitofish in the future if populations decline. A fisheries biologist should be contacted prior to mosquitofish stocking to help determine the optimal conditions, location, and time of the year to stock mosquitofish. According to the California Department of Fish and Game, there are no special requirements or restrictions for stocking moquitofish into these wetlands.

Major Operation and Maintenance Activities

Major operation and maintenance activities are described in the following sections.

Major Vegetation Removal and Replanting

Maintenance of the wetland plant community may be needed at some point in the future to assure that the wetland systems continues to function properly. Emergent wetland plants provide for microbial growth and pollutant assimilation. Vegetation management will help to enhance nutrient removal capabilities of the wetland system, especially for nitrogen. To maintain

a healthy emergent plant community, it is necessary to control optimal water levels for plant growth, remove undesirable weed species from the wetland, harvest or thin vegetation community, and remove dead or floating debris from the wetland system.

Major Sediment/Bottom Substrate Maintenance

Due to the high concentrations of TSS in the inflow waters, it will be necessary to periodically remove the solids that settle out in the sediment basins. The sediment basins of these constructed wetlands are specifically designed to reduce the amount of TSS in the inflow water prior to it entering the treatment cells of the wetlands. Therefore, the sediment basins require more frequent removal or dredging of sediment from them. Given estimated sediment accumulation rates of 7 - 10 cm/yr and a forebay depth of 10 feet, an estimated 30% of the forebay volume would be filled in 15-20 years at the Alamo River wetlands. For the treatment cells, the estimated sediment accumulation rates are 0.4 – 0.5 cm/yr in the treatment cells. The amount of time it takes to fill the treatment cells will likely increase if the sediment forebays are properly maintained. An annual estimate of sediment accumulation in the wetland should be conducted to help determine appropriate maintenance needs.

Pollutant levels in the sediment should be monitored to help determine risks to wildlife. Although this has not occurred anywhere in the New River pilot wetlands over the nearly 10 years of operation, sediment may need to be removed from the wetland if it becomes toxic to fish and other wildlife. At present it is proposed that wetland sediment sampling be conducted every two to three years to evaluate the buildup of potentially bioaccumulative and toxic substances. The results from these monitoring activities should be compared to established toxicity levels, discussed as part of the ecological risk assessment, to determine if unacceptable concentrations of pollutants exist in the sediment.

The sediment basins of both the Shank Road and Holtville wetlands are designed for cleanout by ground-based excavators. The excavators will have access to the basins from roads immediately adjacent to their side banks. Sediments removed from the basins will be placed in designated areas within the wetland site perimeters.

Best Management Practices (BMPs) will be used to control water flow and sediment losses during sediment removal operations. BMPs may include bypassing flows around removal zones, closing the entrance gates, damming/detaining flows to isolate sediment within the sediment removal zone, filtering water leaving the zone, or other standard management practices.

Berms and Embankments (Erosion Control)

During site visits to the New River pilot wetlands in 2005 and 2006, it was observed that there were several areas in both wetlands where bank erosion is occurring. The main causes of erosion appear to be from muskrats or from wave action. The sediment forebays seem to be particularly susceptible to erosion from wave action. This is most apparent along the stretches of shore that are devoid of emergent vegetation. The emergent vegetation growing along the shoreline appears to protect it from being eroded by wave action.

Preventative measures will be included in the Shank Road and Holtville sites minimize bank erosion and thus minimize the need for long term maintenance. Measures to control bank erosion include planting vegetation in erosion prone areas, building erosion control structures, placement of barriers within the berms to prevent burrowing that could lead to piping failures, using fiber rolls for bank stabilization, and grading areas where erosion may occur. Encouraging the growth of small shrubs, grass, and other herbaceous plants in erosion prone areas can help to reduce erosion through the soil binding properties of these plants root systems. Emergent aquatic plants can be used to stabilize bottom sediments and dampen wave action in certain areas. Fiber rolls are cylindrical tubes made of coconut fibers or excelsior fibers. These rolls are bound together with twine or plastic netting and placed along erosion prone areas. The fiber roll protects the bank by stabilizing the toe of the slope and trapping sediment from the sloughing bank.

Emergency Operation and Maintenance Activities

In rare instances, there may be the need to perform operation and maintenance activities in order to protect people, property, or wildlife. Accidental spills of hazardous materials such as fuels or other hazard substances into the wetlands or floods from a catastrophic rupture are examples of occurrences that may create the need for an emergency response. If such events do occur, the appropriate regulatory agencies should be contacted immediately. The County or cities are typically responsible for hazardous waste cleanup, but additional personnel may need to be there to assist or assess the extent of damage. In these emergency situations, all available man power and the necessary equipment to adequately respond to the situation should be made available.

Wildlife Monitoring and Identification of Sensitive Habitats

A qualified wildlife biologist should be utilized to identify any sensitive areas or species of special concern within the wetlands. Any federally or State listed endangered or threatened species should be identified and special precautions should be taken during LTM activities to minimize any intrusions on their habitat. A log should be kept during LTM activities to note any sighting or signs of species of special concern in the wetlands. The wildlife biologist should also identify certain areas or times of the year when particular maintenance activities should be avoided to limit disturbances to native wildlife (i.e. during the waterfowl or shorebird nesting season). The wildlife biologist can also be used to assist with the identification of nuisance plant species within the wetlands and recommend the appropriate removal methods for these nuisance or invasive plant species.